TECH TIP

from the ATARI FIELD SERVICE DEPARTMENT

ATARI

STAR WARS*

Atari Color X-Y Display Deflection PCB

You should do the following modification to help prevent the Deflection PCB from failing. *This modification should only be performed by a qualified technician.*

Parts List

Quantity	Description	Part No.
6	Type-1N4002 Diode	31-1N4002
2	Type-1N754A 6.8 V Zener Diode	131002-001
2	Type-1N756A 8.2 V Zener Diode	32-1N756A
2	12 Ω, ±5%, ¼ W Resistor	110000-120

1. Connect the two type-1N754A zener diodes together as shown in Figure 1. The connection is made as follows: bend the anode ends of both diodes into a "fish-hook" pattern. Hook the two fish-hooked leads together, and solder them. Remember that too much heat will destroy the semiconductor material.
2. Connect the two type-1N756A zener diodes together as shown in Figure 1. Use the same technique as described in Step 1 above.
3. Remove diode CR2 and solder in a type-1N4002 diode in its place.
4. Remove diode CR11 and solder in a type-1N4002 diode in its place.
5. Remove resistor R12 and solder in a 12 Ω, ¼ W resistor in its place.
6. Remove resistor R35 and solder in a 12 Ω, ¼ W resistor in its place.
7. Find the Y-Deflection Circuit (upper left area of the schematic). Resistor R1 has two leads to it. Find the lead that goes to the yellow wire. Connect this lead to the cathode of one of the type-1N754A diodes. Connect the cathode of the other type-1N754A diode to ground.
8. Find resistor R24. It has two leads: one runs to an orange wire. Connect this lead to the cathode of one of the type-1N756A diodes. Connect the cathode of the other type-1N756A diode to ground.
9. Find the type-2N3792 transistor Q17. You will be installing a type-1N4002 diode across this transistor's emitter and collector. Solder the cathode lead of the type-1N4002 diode to the emitter, and solder the anode to the collector of this transistor.
10. Find the type-2N3617 transistor designated Q16. You will be installing a type-1N4002 diode across this transistor's emitter and collector. Solder the cathode lead of the type-1N4002 diode to the collector, and solder the anode to the emitter of this transistor.

11. Find the type-2N3792 transistor Q7. You will be installing a type-1N4002 diode across this transistor's emitter and collector. Solder the cathode lead of the type-1N4002 diode to the emitter, and solder the anode to the collector of this transistor.
12. Find the type-2N3716 transistor Q6. You will be installing a type-1N4002 diode across this transistor's emitter and collector. Solder the cathode lead of the type-1N4002 diode to the collector, and solder the anode to the emitter of this transistor.

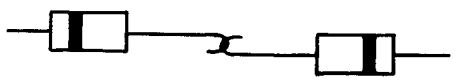

Figure 1 Making Fish-Hook Connections

This is a summary of all the STAR WARS Tech Tips issued since the coin-operated game was put into production. We are providing this summary for your convenience.

STAR WARS Main PCB

Bad DIP Switches

Problem: Even though you may have set the DIP switches to off or on, they may not rect to these settings. During the production run of STAR WARS, we discovered a bad batch of these switches (they are dark blue).

Solution: Follow the instructions in Chapter 2 of the STAR WARS Operators Manual (TM-225 or TM-245) for setting the options. If you still have problems with the options, test the DIP switches to see if they are good. Note: If you change the option switches on the Main PCB, you *must* go back to the game options display. Select the line marked *reset options* and change this to *yes*. If you don't do this step, the options will remain unchanged.

Missing Stars

Problem: During the attract mode or game play, the screen may not show stars or only one star. In addition, lights may not exist on the surface of the Death Star, so that the towers look like they're floating in space. This problem usually occurs when the game is first powered up.

Short-Term Solution: Turn the power switch off and on until stars reappear, or short out the reset test points on the Main PCB.

Long-Term Solution: Change the EPROM on the Main PCB at location 1F from a part number 136021-114 to a 136021-214.

All games built after the following serial numbers have incorporated the above EPROM change:

Upright:	serial number UR 9275
Sit-Down:	serial number SD 1388

NOVRAM Failure

Problem: In self test the hardware error screen displays *NON VOLATILE RAM AT 1E.* This is an intermittent problem that occurs most often when the game is cold or upon initial power-up.

Solution: Change the 1000 Ω resistor R9 on the Main PCB to a 470 Ω resistor. You may instead "piggyback" a 1000 Ω resistor in parallel with the existing 1000 Ω resistor.

All games built after the following serial numbers have incorporated the above resistor change:

Upright:	serial number UR 9751
Sit-Down:	serial number SD 1880

Note: Very few boards had this problem. You will probably never see it, even if your board does not have the modification.

STAR WARS Vector-Generator PCB

Shaky Video

Problem: Some games may have shaky video after a 15-minute warm-up. The video will start to shake in the high-score screen. The words *PRINCESS LEIA'S REBEL FORCE* will start to flutter and then worsen to an up-and-down movement of about ⅛ inch. In its worst state, the scores will also move back and forth.

Solution: Change the 10k Ω resistor R83 on the Vector-Generator PCB to a 20k Ω resistor.

STAR WARS Color X-Y Display

Zero-Ohm Resistor Jumpers

Problem: The **brown** zero-ohm jumpers (W1 or W2) on the Deflection PCB open up. In addition, the same type of brown jumper may open up on the High-Voltage PCB. Zero-ohm resistors look like regular resistors, but are marked on the PCB assembly and the schematic with a *W* followed by a number.

Solution: Replace the jumpers with pieces of wire. Note that the *white* and *tan* jumpers are good and don't have to be replaced.

Capacitor Failure

Problem: Capacitors C3 and C4 on the High-Voltage PCB may be defective. These are rated at 100 μF, 35 V.

Solution: Change C3 and C4 to 220 μF, 35V with a low E.S.R. (equivalent series resistance) rating. The Atari part no. is 123009-227. The following manufacturers' capacitors will also work:

Illinois Capacitor, part no. 227 RMR 050M (50 V)

Nichicon, part no. UPA1V221M (35 V)